FAIR SIS100 Status Report

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SYSTEM DESIGN

The system design has been further detailed. In order to prepare the specification of the extractions system components, special attention has been directed onto the completion of the design of the extraction straight. In this context, the design of the radiation hard normal conducting quadrupole magnets downstream the electrostatic septa has been developed. A special lifting device is required to open the two heavy yoke halfs for the bake-out system of the vaccum chamber. The special vacuum chambers of the normal conducting magnets consist of a main chamber for the revolving beam and an attached anti-chamber which hosts an impact plate for stripped beam ions and NEG panels for the removal desorped molecules.

New beam dynamics studies for the Proton operation have indicated potential beam loss by an insufficient bucket area. Therefore, the original concept of avoiding a gamma-T jump by means of a dedicated optics setting requires further verifications. However, it has been decided to keep a fast transition energy crossing as fall back-option. Therefore, positions for fast s.c. jump-quadruples has been defined and the feasibility of appropriate s.c. magnets is being studied. The application of the correction multipole systems situated at the ends of the six arcs has been studied for various beam dynamics issues. The main resonances in the neighbourhood of the heavy ion working point have been identified and the decision has been taken to build all quadrupoles as normal magnets, all sextupole magnets as skew magnets and all octupole magnets as normal magnets.

SUPERCONDUCTING MAGNETS

The design of the SIS100 dipole module has been completed by the manufacturer BNG. All major design reviews have been passed and the production of major parts of the magnet has been started. The special superconducting wire based on a Copper-Manganese matrix has been delivered from VNIINM (Bochvar) and the cable for the first of series dipole magnet could be produced without major difficulties or wire ruptures. The winding technique for the production of the single layer coil has been developed by means of a copper dummy cable. After initial difficulties, the small radius of curvatures of the coil ends could be realized with sufficiently small tolerances. However, it turned out that the production of the single layer coil is more challenging than of the two layer coil.

A major quadrupole module of the arc center has been selected as first of series module. The production ready design of this module and all its subcomponents (steerer magnet, sextupole magnet, BPM, cryocatcher, vacuum system, girder, cryostat etc.) has been completed by the GSI design department. I parallel, the tendering process for the completion of the engineering design of all remaining modules was launched. For the layout of the cryostat safety system, which shall cover major damages of the He system, simulations on the hydraulic shock propagations are performed at ILK Dresden.

RF SYSTEMS

The specifications for the acceleration and bunch compression systems and all appendices have been completed. The procurement of the ferrit loaded cavities of the acceleration system is in the responsibility of the FAIR GmbH, while the bunch compression cavities will be procured as German inkind contribution by GSI. The procurement of the supply units, the low level Rf systems and gap periphery will be excecuted in a separate processes. All tendering processes are in preparation.

INJECTION/EXTRACTION SYSTEMS

Further tests have been performed with the model setup of the bipolar kicker pulse power generator. Alternatively, a new circuit layout has been proposed which seem to provide more safety with respect to the cross talk among the two main thyratron switches. The new circuit layout makes use of two PFN systems instead of the originally foreseen one PFN system, but does not require a main pulse transformer.

LOCAL CRYOGENICS

A major change in the design of the SIS100 local cryogenics system has been proposed. All HTS current lead boxes, originally situated in the second floor of the supply tunnel, have been moved into the niches on the level of the accelerator. Thereby, two cold links could be removed completely. The challenge of the remaining cold link in niche 5 has been reduced to the supply the reference magnet system instead of the supply of the accelerator.

Two major specifications for local cryogenics components which will be part of the string test have been completed. In parallel, Wroclaw University continued working on the design of the bypass lines. The layout of the interconnections at the ends of the accelerator arcs are under design.